

Pump Check-up

Oil-

Level (low oil causes everything to stress around pumps)
Condition: (black is bad, metal flake are worse.)
Leaks @ plunger seals (more than one is not a warrantable problem! AKA “factory flaw”)
Leaks @ drain plug (last service included carelessness)
Leaks @ crank seals (indicates bearing heat)
Leaks @ cover plate (hardware left loose or vibration issue)

The Head-

Water leaks @ back of head? (water seals, or seal retainer o-ring leaking)
Water leaks @ crankcase? (plunger seal leaking)
Water leaks @ valve caps? (cap o-rings leaking, or cavitation cracked the valve cap)

Under the head-

Do Not remove “allen head” bolts without “screw grab” or surface grip dip.
Head bolts rusty? Pitted? (Indicates seals bleeding over a long while)
Head bolts stripped? (previous service over-torqued it)
Indentation of seal retainers into crankcase?
Seal retainers cracked? (cavitation damage)
Seal retainers scratched from rubbing plunger? (indicates crankcase wear)
Hairline cracks in plunger? Look closely and with a mirror.
Do NOT remove ceramic plungers just to clean or to inspect them! They are too easy to break!
Clean them w/ scotchbrite scrub pads and use a mirror !

Inside Crank case-

Rod caps tight? (Not seized! they should jiggle side to side up to 1/16”)
Hardware tight? (carelessness is foolishness)
Metal flakes in oil? (oil added after a rod failure?!)
Rust on crank? (water causes abrasives to grow in pumps)
Rust on bearings? (bearing heat can damage seals)

Seal Installation

- 1.) Clean brass of water scale & soap scale, which is thicker than a film or stain.
- 2.) Replace brass retainer o-rings with new. Seal them with a tiny film of silicone sealant if there's any brass damage.
- 3.) Grease seals for install into retainer and grease cylinder ports at seal surfaces
- 4.) Grease seal retainer and install stacks, be sure to align back up rings' ridges to provide maximum pressure against seals. Tap seal stacks with rubber or brass mallet until seated to proper depth into head. NOTE: They slide right in to 1/8" from home when installing with your thumbs and fingers. If not, don't bother tapping with mallet. There's something wrong and you must start over if necessary to find the problem. Fingers can't hurt the seals, but pounding them in the wrong position will!
- 5.) Plunger bolts...
Note: clean ALL debris from piston and crush washers...use aerosol carb cleaner if you have to! Any debris against the ceramic will cause stress cracks when installed. Must be clean, and gets a new o-ring every time!
A little silicone seal makes it fit easy and double seals the copper crush washer. Use one drop of red lock tite on threads as insurance.
- 6.) Head bolts...anti-seize the threads (a little dab will do it!) but grease the shank so it won't rust. Also a few rust pits on a used bolt are ok but major pitting weakens the shank so sell 'em a new one!

Pump Check List Date:

Oil Condition: _____
Oil Leaks: _____
Oil Level: _____

Bearing / Shaft Play: _____

Valves and O-rings: _____

Valve Caps: _____

Plunger Cracks: _____
Scratches: _____

Piston Play: _____
In & Out: _____
Up & Down: _____

Brass Retainers:
Cracks: _____
Scratches: _____
Wear marks n scars (from piston slop): _____

Head issues:
cracks under the valve seat O-rings _____

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Valve Caps: _____

Plunger Cracks: _____
Scratches: _____

Piston Play: _____
In & Out: _____
Up & Down: _____

Brass Retainers:
Cracks: _____
Scratches: _____
Wear: _____